

NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

HIGHLIGHTED ARTICLES

[Towards predictive understanding of regional climate change](#)

Nature Climate Change (14.547)

[Widespread coho salmon spawner mortality in western U.S. watersheds: lethal stormwater impacts are prevented by soil bioinfiltration](#)

Journal of Applied Ecology (4.740)

[Changing trophic structure and energy dynamics in the Northwest Atlantic: implications for Atlantic salmon feeding at West Greenland](#)

Marine Ecology Progress Series (2.64)

[Emergent properties delineate marine ecosystem perturbation and recovery](#)

Trends in Ecology and Evolution (16.196)

[First hydrothermal discoveries on the Australian-Antarctic Ridge: discharge sites, plume chemistry, and vent organisms](#)

Geochemistry, Geophysics, Geosystems (2.923)

ADDITIONAL ARTICLES

[NMFS Publications](#)

[Spatial and temporal patterns of Black Sea bass sizes and catches in the Southeast United States inferred from spatially explicit nonlinear models](#)

Marine and Coastal Fisheries (1.810)

[Using socio-economic and fisheries involvement indices to understand Alaska fishing community well-being](#)

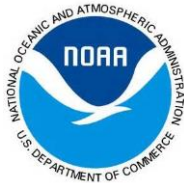
Coastal Management (1.748)

[Transport and connectivity modeling of larval permit from an observed spawning aggregation in the Dry Tortugas, Florida](#)

Environmental Biology of Fishes (1.356)

[Effectiveness of managed gene flow in reducing genetic divergence associated with captive rearing](#)

Evolutionary Applications (3.896)



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

[Using habitat association models to predict Alewife and Blueback Herring marine distributions and overlap with Atlantic Herring and Atlantic Mackerel: can incidental catches be reduced?](#)

ICES Journal of Marine Science (2.525)

[A burning problem: social dynamics of disaster risk reduction through wildfire mitigation](#)

Human Organization (0.56)

[The relationship between vessel traffic and noise levels received by killer whales \(*Orcinus orca*\)](#)

PLoS ONE (3.534)

[Variation in growth among individuals and over time: a case study and simulation experiment involving tagged Antarctic toothfish](#)

Fisheries Research (1.843)

[Response of diatom and dinoflagellate lifeforms to reduced phosphorus loading: a case study in the Thau lagoon, France](#)

Estuarine, Coastal and Shelf Science (2.057)

[Increasing the quality, comparability and accessibility of phytoplankton species composition time-series data](#)

Estuarine, Coastal and Shelf Science (2.057)

[Enhanced susceptibility to predation in corals of compromised condition](#)

Peer J (2.1)

[Quantifying the trophic importance of Gulf menhaden *Brevoortia patronus* within the northern Gulf of Mexico ecosystem](#)

Marine and Coastal Fisheries (1.81)



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

[Changes and trends in the overexploited fish assemblages of two fishing grounds of the North Atlantic](#)

ICES Journal of Marine Science (2.525)

[Trophic ecology of Atlantic bluefin tuna \(*Thunnus thynnus*\) larvae from the Gulf of Mexico and NW Mediterranean spawning grounds: a comparative stable isotope study](#)

PLOS One (3.534)

[Relationships within *Cladobranchia* \(Gastropoda: Nudibranchia\) based on RNA-Seq data: an initial investigation](#)

Royal Society Open Science (5.784)

[Precipitation as a driver of phytoplankton ecology in coastal waters: a climatic perspective](#)

Estuarine, Coastal and Shelf Science (2.057)

[Genome-wide investigation of adaptation to harmful algal blooms in common bottlenose dolphins \(*Tursiops truncatus*\)](#)

Molecular Ecology (5.84)

[Evaluating trophic and non-trophic effects of shellfish aquaculture in a coastal estuarine food web](#)

ICES Journal of Marine Science (2.525)

[Changes in size composition and relative abundance of fishes in central California after a decade of spatial fishing closures](#)

California Cooperative Oceanic Fisheries Investigations (CalCOFI) Reports (1.120)

[Making landfall: linkages between fishing communities and support services](#)

Coastal Management (1.748)

[A novel mode of embryonic nutrition in the tiger shark, *Galeocerdo cuvier*](#)

Marine Biology Research (1.475)



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

[An assessment of phytoplankton primary productivity in the Arctic Ocean from satellite ocean color/*in situ* chlorophyll-*a* based models](#)

Journal of Geophysical Research: Oceans (3.44)

[Long distance migration of prey synchronizes demographic rates of top oceanic predators](#)

Journal of Animal Ecology (4.504)

[The rapid return of marine-derived nutrients to a freshwater food web following a century of damming](#)

Conservation Biology (4.32)

[Variability in haul seine retention rates and its effects on abundance and size structure estimates of Black Crappie and Sunfish populations](#)

Journal of Southeastern Association of Fish and Wildlife Agencies (N/A)

[Molecular characterization of the gonadal kisspeptin system: cloning, tissue distribution, gene expression analysis and localization in sablefish \(*Anoplopoma fimbria*\)](#)

General and Comparative Endocrinology (2.67)

[Isotopic signatures in the otoliths of reef-associated fishes of southern Florida: linkages between nursery grounds and coral reefs](#)

Regional Studies in Marine Science (N/A)

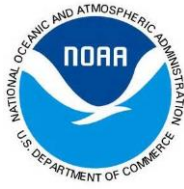
[Linking transcriptional responses to organismal tolerance reveals mechanisms of thermal sensitivity in a mesothermal endangered fish](#)

Molecular Ecology (5.84)

[OAR Publications](#)

[Gap winds and their effects on regional oceanography Part I: Cross Sound, Alaska](#)

Deep-Sea Research Part II (2.763)



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

[Changes in the Lake Michigan food web following dreissenid mussel invasion](#)

Journal of Great Lakes Research (1.77)

[Shifts in bloater consumption in Lake Michigan between 1993 and 2011 and its effects on *Diporeia* and *Mysis*](#)

Transactions of the American Fisheries Society (1.314)

[High-resolution water column survey to identify active sublacustrine hydrothermal discharge zones within Lake Rotomahana, North Island, New Zealand](#)

Journal of Volcanology and Geothermal Research (2.543)

[A review of the remote sensing of lower tropospheric thermodynamic profiles and its indispensable role for the understanding and the simulation of water and energy cycles](#)

Review of Geophysics (12.364)

[Micro-CT analysis of the Caribbean octocoral *Eunicea flexuosa* subjected to elevated pCO₂](#)

ICES Journal of Marine Science (2.525)

[The melting Arctic and mid-latitude weather patterns: Are they connected?](#)

Journal of Climate (4.904)

[NWS Publications](#)

[Diagnosing the conditional probability of tornado damage rating using environmental and radar attributes](#)

Weather and Forecasting (1.860)

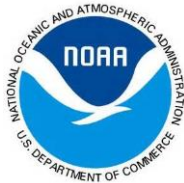
[Cross Line Office Publications](#)

[A proposed revision to the definition of “derecho”](#)

Weather and Forecasting (1.860)

[Phylogenomic analyses support traditional relationships within Cnidaria](#)

PLoS ONE (3.534)



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

[A review of planetary boundary layer parameterization schemes and their sensitivity in simulating Southeastern U.S. cold season severe weather environments](#)

Weather and Forecasting (1.860)

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NOS

[Modeling pygmy sperm whale \(*Kogia breviceps*\) strandings along the southeast coast of the United States from 1992 to 2006 in relation to environmental factors](#)

NOAA Tech Memo

NMFS Publications

[5th International Otolith Symposium](#)

A Conference Review

[Geomorphic responses to U.S. dam removals—a two-decade perspective](#)

Gravel Bed Rivers 8

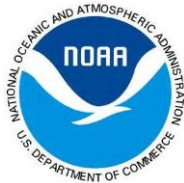
[SCOR Working Group 137: “Global Patterns of Phytoplankton Dynamics in Coastal Ecosystems”: An introduction to the special issue of Estuarine, Coastal and Shelf Science](#)

Estuarine, Coastal and Shelf Science (2.057)

Cross Line Office Publications

[Advancing tools for modeling, forecasting and managing for *Vibrio* spp. in Washington State](#)

NOAA Tech Memo



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

HIGHLIGHTED ARTICLES

Towards predictive understanding of regional climate change

Nature Climate Change (14.547)

S.P. Xie, C. Deser, **G.A. Vecchi (OAR/GFDL)**, M. Collins, **T. Delworth (OAR/GFDL)**, A. Hall, E. Hawkins, N.C. Johnson, C. Cassou, A. Giannin, M. Watanabe

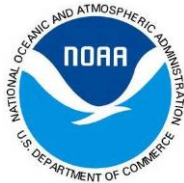
- Atmospheric circulation changes are the main source of uncertainty in regional climate projections
- Atmospheric circulation changes are tightly coupled with the ocean in the tropics but are significantly driven by internal variability in the extratropics
- Regional climate models do not automatically solve the problem of regional climate change as they inherit uncertainties from global models
- The authors conclude that the current priority is to understand and reduce uncertainties on scales greater than 100 km to aid assessments at finer scales.

Regional information on climate change is urgently needed but often deemed unreliable. To achieve credible regional climate projections, it is essential to understand underlying physical processes, reduce model biases and evaluate their impact on projections, and adequately account for internal variability. In the tropics, where atmospheric internal variability is small compared with the forced change, advancing our understanding of the coupling between long-term changes in upper-ocean temperature and the atmospheric circulation will help most to narrow the uncertainty. In the extratropics, relatively large internal variability introduces substantial uncertainty, while exacerbating risks associated with extreme events. Large ensemble simulations are essential to estimate the probabilistic distribution of climate change on regional scales. Regional models inherit atmospheric circulation uncertainty from global models and do not automatically solve the problem of regional climate change. The authors conclude that the current priority is to understand and reduce uncertainties on scales greater than 100 km to aid assessments at finer scales.

Expected publication date: October 2015

Widespread coho salmon spawner mortality in western U.S. watersheds: lethal stormwater impacts are prevented by soil bioinfiltration

Journal of Applied Ecology (4.740)



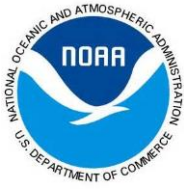
NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

J. A. Spromberg, D. H. Baldwin, S. Damm, J. K. McIntyre, M. Huff, C. A. Sloan, B. F. Anulacion, J. W. Davis, N. L. Scholz (NMFS/NWFSC)

- First direct demonstration that urban runoff is acutely lethal to coho salmon spawners
- Toxicity can be eliminated by pre-treating runoff with conventional and inexpensive soil bioinfiltration methods

Adult coho salmon (*Oncorhynchus kisutch*) return each fall to freshwater spawning habitats throughout western North America. The migration coincides with increasing seasonal rainfall, which in turn increases stormwater runoff, particularly in watersheds with urban and suburban land cover characteristics. For more than a decade, field assessments in urban stream networks have shown that adult coho are dying prematurely, often at rates exceeding 50% of the entire fall run. Such high levels of mortality are a significant concern for the long-term conservation and recovery of wild coho, particularly those distinct population segments vulnerable to ongoing and future development pressures in northern California, Oregon, Washington, and southern British Columbia. Although indirect evidence implicates toxic runoff as causing the mortality syndrome, this has not been directly demonstrated. In this study, researchers exposed otherwise healthy coho spawners to 1) artificial stormwater containing mixtures of metals and petroleum hydrocarbons, at or above concentrations previously measured in urban runoff; 2) undiluted stormwater collected from a high traffic volume urban arterial (i.e., highway runoff); and 3) highway runoff that was first pre-treated via bioinfiltration through experimental soil columns to remove pollutants. Researchers find that mixtures of metals and petroleum hydrocarbons – conventional toxic constituents in urban stormwater – are not sufficient to cause the spawner mortality syndrome. By contrast, untreated highway runoff collected over nine distinct storm events was universally lethal to adult coho relative to unexposed controls. Lastly, the mortality syndrome was prevented when highway runoff was pretreated by soil infiltration. The causal chemical constituents remained unidentified, but these results are the first direct evidence that toxic runoff is killing adult coho in urban watersheds.

Accepted: 26 August 2015



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

Changing trophic structure and energy dynamics in the Northwest Atlantic: implications for Atlantic salmon feeding at West Greenland

Marine Ecology Progress Series (2.64)

M.D. Renkawitz, T. F. Sheehan, H. J. Dixon, and R. Nygaard (NMFS/NEFSC)

- This paper examines declining North American and European salmon populations to better understand trophic mechanisms that may be contributing to their decline.
- Results showed lower estimates of total energy consumption over time.
- The work suggests that large-scale climate conditions in the past 40 years has altered trophic dynamics of Atlantic salmon and likely other important species.

Changes in large-scale climate conditions in the Northwest Atlantic caused a phase shift in productivity, altering trophic pathways that influence the growth, survival, and abundance of many species. Despite diverse population structures and management regimes, concurrent abundance declines of disparate North America and European Atlantic salmon populations suggests that conditions experienced at common marine areas may be causative. To understand the trophic mechanisms contributing to population declines, 1451 Atlantic salmon stomachs were collected and examined from individuals caught between 2006 and 2011 at the West Greenland feeding grounds. Standardized stomach content weight and proportions of taxa consumed were similar between historical (1965-1970) and contemporary samples, although lower-quality boreoatlantic armhook squid (nearly absent from historical data) was of moderate importance in contemporary samples while higher-quality capelin decreased in importance. Furthermore, from 1968-2008 mean energy density estimates of capelin (the regional keystone forage species) decreased approximately 33.7%. This resulted in lower estimates of total energy consumption by Atlantic salmon over time. Results indicate that altered trophic dynamics caused by 40 years of changing ocean conditions negatively influenced Atlantic salmon, and likely many other commercially, culturally, and ecologically important species in the Northwest Atlantic. Determining the primary mechanisms that influence marine food-webs is necessary to fully understand and evaluate survival and productivity trends, and establish realistic management targets for commercial, recreational, and protected species.



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

Accepted: 26 August 2015

Emergent properties delineate marine ecosystem perturbation and recovery
Trends in Ecology and Evolution (16.196)

J. Link (NMFS/NEFSC)

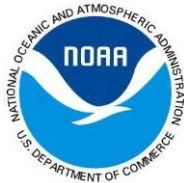
- We develop cumulative trophic patterns for marine ecosystems, featuring cumulative sigmoidal biomass-trophic level and “hockey stick” production-biomass curves.
- These patterns have strong global support, being observed in over 120 marine ecosystems.
- Cumulative curve parameters can help delineate when marine ecosystems are perturbed or recovered, integrating across a wide range of stressors and response mechanisms.
- Knowing when an ecosystem is perturbed or recovered is not a trivial finding and can help us better detect and manage marine ecosystems\

Whether there are common and emergent patterns from marine ecosystems remains an important question. This is important because marine ecosystems provide billions of dollars of ecosystem services to the global community, but face many perturbations with significant consequences. We develop cumulative trophic patterns for marine ecosystems, featuring cumulative sigmoidal biomass-trophic level and “hockey stick” production- biomass curves. The patterns have a trophodynamic theoretical basis and capitalize on emergent, fundamental, and invariant features of marine ecosystems. These patterns have strong global support, being observed in over 120 marine ecosystems. Parameters from these curves elucidate the direction and magnitude of marine ecosystem perturbation or recovery; if biomass and productivity can be monitored effectively over time, such relationships may prove to be broadly useful. Curve parameters are proposed as possible ecosystem thresholds, perhaps to better manage the world’s marine ecosystems.

Expected publication date: November 2015

First hydrothermal discoveries on the Australian-Antarctic Ridge: discharge sites, plume chemistry, and vent organisms

Geochemistry, Geophysics, Geosystems (2.923)



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

D. Hahm, **E. T. Baker**, T. S. Rhee, Y. -J. Won, **J. A. Resing**, **J. E. Lupton**, W. -K. Lee, M. Kim, and S. -H. Park (**OAR/PMEL**)

- The Australian-Antarctic Ridge is one of the largest unexplored regions of the global mid-ocean ridge system.
- Hydrothermal plumes along KR1 and KR2, two previously uncharted segments of the AAR, were mapped with 47 MAPR profiles.
- The densest area of hydrothermal activity, named “Mujin,” was also populated by *Kiwa* crabs and seven-armed *Paulasterias* starfish. The presence of these crabs and starfish raises the possibility that all Southern Ocean ridges and deep seas might be biogeographically connected.

The Australian-Antarctic Ridge (AAR) is one of the largest unexplored regions of the global mid-ocean ridge system. Here, we report a multi-year effort to locate and characterize hydrothermal activity on two 1st-order segments of the AAR: KR1 and KR2. To locate vent sites on each segment, we used profiles collected by Miniature Autonomous Plume Recorders on rock corers during R/V Araon cruises in March and December of 2011. Optical and oxidation-reduction-potential anomalies indicate multiple active sites on both segments. Seven profiles on KR2 found 3 sites, each separated by ~25 km. Forty profiles on KR1 identified 13 sites, some within a few km of each other. The spatial density of hydrothermal activity along KR1 and KR2 (plume incidence of 0.34) is consistent with the global trend for a spreading rate of ~70 mm/yr. The densest area of hydrothermal activity, named “Mujin”, occurred along the 20-km-long inflated section near the segment center of KR1. Continuous plume surveys conducted in January-February of 2013 on R/V Araon found CH₄/3He (1-15 × 10⁶) and CH₄/Mn (0.01-0.5) ratios in the plume samples, consistent with a basaltic-hosted system and typical of ridges with intermediate spreading rates. Additionally, some of the plume samples exhibited slightly higher ratios of H₂/3He and Fe/Mn than others, suggesting that those plumes are supported by a younger hydrothermal system that may have experienced a recent eruption. The Mujin-field was populated by *Kiwa* crabs and seven-armed *Paulasterias* starfish previously recorded on the East Scotia Ridge, raising the possibility of circum-Antarctic biogeographic connections of vent fauna.

Publication date: 15 September 2015



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

Available online: <http://onlinelibrary.wiley.com/doi/10.1002/2015GC005926/full>

ADDITIONAL ARTICLES

NMFS Publications

Spatial and temporal patterns of Black Sea bass sizes and catches in the Southeast United States inferred from spatially explicit nonlinear models

Marine and Coastal Fisheries (1.810)

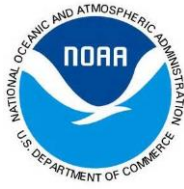
N. M. Bacheler (NMFS/SEFSC) and J. Ballenger

- This study used a spatially explicit, generalized additive modeling approach with 24 years of fishery-independent trap data to elucidate the spatiotemporal dynamics of size and size-specific catch-per-unit-effort of Black Sea Bass (*Centropristis striata*) along the southeast Atlantic coast of the United States.
- Black sea bass lengths have been increasing over the last 3 decades
- Catch rates of black sea bass have also increased over the last 5 years
- Catch rates of black sea bass were higher inshore, but fish were smaller inshore and southward and larger northward and offshore

Temporal and spatial variability in abundance often results from the effects of environmental and landscape variables interacting over multiple spatial scales, and understanding the complex interplay among these variables is key to elucidating the drivers of a species' population dynamics. This study used a spatially explicit, variable-coefficient generalized additive modeling approach with 24 years of fishery-independent trap data (N = 11,726 samples) to elucidate the spatiotemporal dynamics of size and size-specific catch-per-unit-effort of Black Sea Bass (*Centropristis striata*) along the southeast Atlantic coast of the United States.

Black Sea Bass catch exhibited complex spatial and temporal dynamics that were influenced by environmental, landscape, and sampling effects. Black Sea Bass were more commonly caught inshore than offshore, but were significantly smaller inshore and southward and larger offshore and northward in the study area.

Moreover, the spatial distribution of Black Sea Bass changed as abundance varied within and among sampling seasons. Standardized mean length of Black Sea Bass also increased by more than 20% over the study period, from 230 mm total length in the early 1990s to 280 mm total length after 2010. These results elucidate the



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

spatial and temporal dynamics of Black Sea Bass, inform population structure and indices of abundance, and provide an analytical framework that can be easily adapted to other species and systems.

Accepted: 14 September 2015

Using socio-economic and fisheries involvement indices to understand Alaska fishing community well-being

Coastal Management (1.748)

A. Himes-Cornell and S. Kasperski (NMFS/AKFSC)

- This paper summarizes research aimed at using secondary data to develop socio-economic and fisheries involvement indices to measure objective fishing community well-being in Alaska.
- There is a need to develop much quicker and more quantitative methods for assessing community well-being and potential impacts from fisheries management decisions.
- The methodology presented here follows work done in other regions of the U.S., with the intent to create a standard set of quantitative indices that can be used for cross-regional and nationwide analysis, of fishing community well-being and vulnerability.

Over recent years, fisheries managers have been going through a paradigm shift to prioritize ecosystem-based management. With this comes an increasing need to better understand the impacts of fisheries management decisions on the social well-being and sustainability of fishing communities. Data from more than 300 communities in Alaska were used to create a database of socio-economic and fisheries involvement indices of objective well-being and adaptability for Alaska communities dependent on marine resources. Each index was developed using a principal components factor analysis to assess the relative position of each community compared to all other communities in Alaska. Communities may be grouped or typed based on a set of common, but they will still retain distinct characteristics that will not be identical across communities. Given this, no two communities will be equally affected by changes in any of the variables that are commonly used to measure community vulnerability or well-being. The authors find that creating performance measures, such as the indices presented here,



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

provides a useful way to track the status of socio-economic conditions and fisheries involvement by communities over time.

Expected publication date: Early 2016

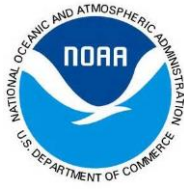
Transport and connectivity modeling of larval permit from an observed spawning aggregation in the Dry Tortugas, Florida

Environmental Biology of Fishes (1.356)

D. R. Bryan, J. Luo, J. S. Ault, D. B. McClellan, **S. G. Smith** (NMFS/NWFSC), **D. Snodgrass** (NMFS/SEFSC), and **M. F. Larkin** (NMFS/SER)

- This study investigated the possible fate and connectivity of larvae spawned in the Dry Tortugas and two other published aggregation sites through a drift analysis using the ocean circulation and transport dynamics simulator HYCOM (Hybrid Community Ocean Model).
- The Dry Tortugas region is a key source of permit recruits to southeast Florida stretching from the Florida Keys and up Florida's east coast, and to a much lesser extent the west Florida shelf.
- Simulations from Belize and Cuba spawning sites revealed high local retention with low connectivity to Florida, emphasizing the importance of local resource management throughout the permit's range.

Large aggregations of adult permit (*Trachinotus falcatus*) were consistently observed since 2004 by divers in a collaborative fishery-independent reef fish visual census survey during May and June on the western-most edge of the Dry Tortugas Bank, Florida in coral reef habitat, indicating proximal spawning sites. New age-length data facilitated the determination of larval durations and rates of juvenile growth. Modeled larval transport data from spawning sites in the Dry Tortugas, Belize and Cuba were evaluated and compared to a spatially-extensive empirical juvenile permit data set from Florida. This study revealed that unique oceanographic processes provided pathways for both downstream larval transport and juvenile retention, to and from Florida waters. These simulation results indicated that the Dry Tortugas region is a key source of permit recruits to southeast Florida stretching from the Florida Keys and up Florida's east coast, and to a much lesser extent the west Florida shelf. Simulations from



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

Belize and Cuba spawning sites revealed high local retention with low connectivity to Florida, emphasizing the importance of local resource management throughout the permit's range.

Accepted: 27 August 27 2015

Available Online:

http://www.researchgate.net/publication/281449604_Transport_and_connectivity_modeling_of_larval_permit_from_an_observed_spawning_aggregation_in_the_Dry_Tortugas_Florida [accessed Sep 10, 2015].

Effectiveness of managed gene flow in reducing genetic divergence associated with captive rearing

Evolutionary Applications (3.896)

C. D. Waters, **J. J. Hard**, M. S. O. Briec, D. E. Fast, K. I. Warheit, **R. S. Waples**, C. M. Knudsen, W. J. Bosch, and K. A. Naish (NMFS/NWFSC)

- This multi-generation study identifies genomic signatures consistent with domestication selection (adaptation to captive culture) in Chinook salmon captive breeding programs.
- The study indicates that genetic divergence from the natural source population was minimal in an integrated hatchery line, which used only naturally derived adults for reproduction, but it was significant in a segregated line, which bred only captive-origin individuals.
- The results demonstrate that the use of naturally born individuals as parents for a captively reared population can reduce genetic differentiation of captive-reared fish from their natural source population.

Captive breeding has the potential to rebuild depressed populations. However, genetic changes associated with captive breeding may decrease restoration success and negatively affect the adaptive potential of the entire population. Thus, approaches that minimize genetic risks should be tested in a comparative framework over multiple generations. Genetic diversity in two captive-reared lines of a species of conservation interest, Chinook salmon (*Oncorhynchus tshawytscha*), was surveyed across three generations using genome-wide approaches. Genetic divergence from the source population was minimal in an integrated line, which used only naturally-derived adults for reproduction, but



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

significant in a segregated line, which bred only captive-origin individuals. Estimates of effective number of breeders revealed that the rapid divergence observed in the segregated line was largely attributable to genetic drift. Three independent tests for signatures of adaptive divergence also identified temporal change within the segregated line, providing possible evidence of domestication selection. These results empirically demonstrate that using naturally-born individuals as parents for a captive-reared population reduces genetic divergence over the short term compared to one that relies solely on captive-origin parents. These findings complement existing studies of captive breeding, which typically focus on a single management strategy and examine the fitness of one or two generations.

Expected publication date: Fall 2015

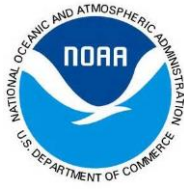
Using habitat association models to predict Alewife and Blueback Herring marine distributions and overlap with Atlantic Herring and Atlantic Mackerel: can incidental catches be reduced?

ICES Journal of Marine Science (2.525)

S. M. Turner, J. P. Manderson, D. E. Richardson, J. J. Hoey, and J. A. Hare (NMFS/NEFSC)

- The authors used generalized additive models (GAMs) to describe habitat associations of Alewife, Blueback Herring, Atlantic Herring, and Atlantic Mackerel.
- Spatial distributions of all four species and their overlap can be modeled, which is an important first step in developing a proactive incidental catch avoidance tool

Concern over the impacts of incidental catches of Alewife, *Alosa pseudoharengus* and Blueback Herring, *A. aestivalis* (collectively managed as ‘river herring’) in the commercial Atlantic Herring (*Clupea harengus*) and Atlantic Mackerel (*Scomber scombrus*) fisheries has resulted in the recent implementation of river herring incidental catch limits. These incidental catches are highly variable in frequency and magnitude, and the environmental conditions associated with these catches are poorly understood. The authors used generalized additive models (GAMs) to describe habitat associations of Alewife, Blueback Herring, Atlantic Herring, and



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

Atlantic Mackerel. Bottom temperature, bottom depth, bottom salinity, solar azimuth and elevation, and region of the Northeast U.S. Continental Shelf were all significant in the habitat models; GAMs explained 25.2, 16.9, 18.9, and 20.6% of the deviance observed for the presence/ absence of Alewife, Blueback Herring, Atlantic Herring, and Atlantic Mackerel. A subset of the data was omitted from the model and the probability of presence was compared with observations; 66-77% of observations were correctly predicted. The individual probabilities of presence were used to quantify and evaluate the accuracy of modeled overlap of Alewife and Blueback Herring with Atlantic Herring (68-72% correct predictions) and Alewife and Blueback Herring with Atlantic Mackerel (57-69% correct predictions). These findings indicate that environmental gradients influence the distributions and overlap of Alewife, Blueback Herring, Atlantic Herring, and Atlantic Mackerel, and with further testing and refinement these models could be developed into a tool to aid industry in reducing incidental catches of river herring. Expected publication date: 30 September 2015

A burning problem: Social dynamics of disaster risk reduction through wildfire mitigation

Human Organization (0.56)

S. Charnley, **M. R. Poe** (NMFS/NWFSC), T. Spies, A. Ager, E. Platt, and K.Olsen

- This paper uses wildfire mitigation to examine the social, political, and economic variables that influence fire hazard and risk reduction treatments.
- Interdisciplinary research to identify how the social dynamics of natural hazard mitigation influences hazard reduction outcomes can contribute to more informed and effective approaches to disaster risk reduction.

Disasters result from hazards affecting vulnerable people. Researchers use the case of wildfire mitigation on US Forest Service lands in the northwestern United States to examine social, political, and economic variables at multiple scales that influence fire hazard and risk reduction treatments and their effectiveness.

Variables highlighted include: policy direction to prioritize wildfire risk reduction in the wildland-urban interface; laws and policies that make treating fuels in some national forest land management allocations challenging; social and political



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

constraints on using prescribed fire; agency budget and target pressures; and integrating fire hazard reduction into forest management projects having multiple objectives. Understanding the social dynamics of natural hazard mitigation is important because they affect its outcomes, creating differential exposure to natural hazards, which is one component of social vulnerability. Interdisciplinary research to identify how the social dynamics of natural hazard mitigation influences hazard reduction outcomes can contribute to more informed and effective approaches to disaster risk reduction.

Accepted: 4 June 2015

The relationship between vessel traffic and noise levels received by killer whales (Orcinus orca)

PLoS ONE (3.534)

J. Houghton, M. M. Holt, B. B. Hanson, D. A. Giles, C. K. Emmons, J. T. Hogan, T. A. Branch, and G. R. Van Blaricom (NMFS/NWFSC)

- Vessels used for whale watching and their associated noise could be detrimental to killer whale populations.
- Results showed vessel speed is the most important predictor of noise levels received by whales in this study.
- This study could potentially influence regulations for whale watching fleets

Whale watching has become increasingly popular as an ecotourism activity around the globe and is beneficial for environmental education and local economies.

Southern Resident killer whales (*Orcinus orca*) are an endangered population that is frequently observed by large groups of whale watchers in the inland waters of Washington state and British Columbia. One factor identified as a risk to the recovery of the population is the effect of vessels and associated noise. Researchers examined the effects of vessels and associated noise on whale behavior with novel equipment, including digital acoustic recording tags (DTAGs). These measured the noise levels the tagged whales received while laser positioning systems allowed collection of geo-referenced data for tagged whales and all vessels within 1000 m of the tagged whale. The objective was to compare vessel data and DTAG recordings to relate vessel traffic to the ambient noise received by tagged whales. For all data, significant predictors of noise levels were length (inverse



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

relationship), number of propellers, and vessel speed, but only 15% of the variation in noise was explained by this model. When research-vessel-only intervals were excluded, vessel speed was the only significant predictor of noise levels, and explained 42% of the variation. Simple linear regressions (ignoring covariates) found that average vessel speed and number of propellers were the only significant correlates with noise levels. We conclude that vessel speed is the most important predictor of noise levels received by whales in this study. Thus, measures that reduce vessel speed in the vicinity of killer whales would reduce noise exposure in this population.

Accepted: 26 August 2015

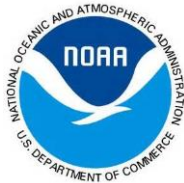
Variation in growth among individuals and over time: A case study and simulation experiment involving tagged Antarctic toothfish

Fisheries Research (1.843)

D. N. Webber and **J. T. Thorson (NMFS/NWFSC)**

- This paper examines persistent and transient growth rates in Antarctic toothfish to look at variation over time among individuals.
- Results show that a growth model incorporating both persistent and transient growth rates provides better estimates of average growth rates

Organisms in the marine environment are likely to exhibit variation in individual growth rates. This variation may be persistent (individuals growing faster/slower throughout their entire lifetime) or transient (individuals growing faster in one year than another year). Understanding variation in growth is necessary when interpreting data regarding size (length or weight) in population models, or when estimating growth given data for tagged individuals. In this study, researchers explicitly model persistent and transient variation in growth rates among individuals in a wild marine population of Antarctic toothfish (*Dissostichus mawsoni*) in the Ross Sea, in addition to sex-specific differences in average growth rates. The model is implemented using maximum marginal likelihood estimation and validated using a simulation study and code is distributed as a publicly available package TagGrowth in the R statistical environment. Using simulated data, researchers show how to accurately estimate parameters for persistent and transient variation in growth rates, and that parameters estimated in these models



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

are reasonably precise given the case study sample sizes. The case study application suggests that transient variation among individuals accounts for up to half of the total variability in Antarctic toothfish. Researchers recommend further research to additionally estimate temporal and spatial variation in growth rates. Estimating multiple sources of growth variation will improve researchers' ability to assess the sensitivity of existing population models to growth variation, as well as to understand the range of variation exhibited by wild marine populations.

Accepted: 1 September 2015

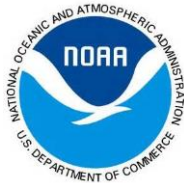
Response of diatom and dinoflagellate lifeforms to reduced phosphorus loading: A case study in the Thau lagoon, France

Estuarine, Coastal and Shelf Science (2.057)

R.J. Gowen, Y. Collos, P. Tett, C. Schere, B. Bec, E. Abadie, M. Allen, and **T. O'Brien (NMFS F/ST7: Marine Ecosystems)**

- This paper examines phytoplankton and phosphorus loading a shallow lagoon in southern France.
- Results show the utility in tools for analyzing a balance in organisms and also the difficulties in reversing eutrophication

The basin of Thau in southern France is a shallow, weakly flushed lagoon which is an important location for oyster cultivation. Phytoplankton analyses were carried out in 1975–1976 and then (almost) continuously since 1987. Researchers report an investigation of ‘the balance of organisms’ in phytoplankton in relation to reductions in phosphorus loading, using two new tools based on phytoplankton: the Plankton Index for Phytoplankton (PIp) and Euclidean distance in state-space. Results show the utility of the tools for analyzing changes in the ‘balance of organisms’ at the level of functional groups (in this study diatoms and dinoflagellates), but also illustrate the difficulties in demonstrating the reversal of human impacts resulting from eutrophication. The comparison between 1987–89 and 1976 showed the expected ‘de-eutrophication’ due to the reduction in dissolved inorganic phosphate (DIP), with a decrease in dinoflagellate abundance. Since 1989, year-to-year variation in annual mean concentrations of DIP may have contributed to inter-annual variability in the balance of the two phytoplankton. But the data suggest that the system has remained in a dynamically stable regime



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

because: (1) there was no long-term trend in Euclidean distance from the reference; and (2) there was no increase in inter-annual variability suggesting a regime change. Monitoring phytoplankton and nutrients concentrations to determine how primary production and the balance of species respond to further changes in the nutrient status of the lagoon should be an integral part of any management program.

Accepted: 26 August 2015

Available online:

<http://www.sciencedirect.com/science/article/pii/S0272771415001237>

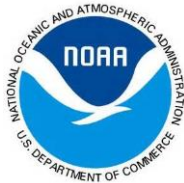
Increasing the quality, comparability and accessibility of phytoplankton species composition time-series data

Estuarine, Coastal and Shelf Science (2.057)

A. Zingone, P. J. Harrison, A. Kraberg, S. Lehtinen, A. McQuatters-Gollop, **T. O'Brien (NMFS/OST)**, J. Sun, and H. H. Jakobsen (NMFS/OST)

- This paper serves as an introductory technical guide for collecting and maintaining quality (phytoplankton) time series observations and data.
- It also provides a brief overview of new technologies that may help increase or supplement better acquisition of quality data.

Phytoplankton diversity and its variation over an extended time scale can provide answers to a wide range of questions relevant to societal needs. These include human health, the safe and sustained use of marine resources and the ecological status of the marine environment, including long-term changes under the impact of multiple stressors. The analysis of phytoplankton data collected at the same place over time, as well as the comparison among different sampling sites, provide key information for assessing environmental change, and evaluating new actions that must be made to reduce human induced pressures on the environment. To achieve these aims, phytoplankton data may be used several decades later by users that have not participated in their production, including automatic data retrieval and analysis. The methods used in phytoplankton species analysis vary widely among research and monitoring groups, while quality control procedures have not been implemented in most cases. Here we highlight some of the main differences in the sampling and analytical procedures applied to phytoplankton analysis and identify



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

critical steps that are required to improve the quality and intercomparability of data obtained at different sites and/or times. Harmonization of methods may not be a realistic goal, considering the wide range of purposes of phytoplankton time-series data collection. However, we propose that more consistent and detailed metadata and complementary information be recorded and made available along with phytoplankton time-series datasets, including description of the procedures and elements allowing for a quality control of the data. To keep up with the progress in taxonomic research, there is a need for continued training of taxonomists, and for supporting and complementing existing web resources, in order to allow a constant upgrade of knowledge in phytoplankton classification and identification. Efforts towards the improvement of metadata recording, data annotation and quality control procedures will ensure the internal consistency of phytoplankton time series and facilitate their comparability and accessibility, thus strongly increasing the value of the precious information they provide. Ultimately, the sharing of quality controlled data will allow one to recoup the high cost of obtaining the data through the multiple use of the time-series data in various projects over many decades.

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Available online:

<http://www.sciencedirect.com/science/article/pii/S0272771415001730>

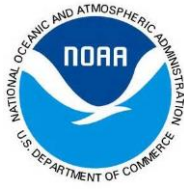
Enhanced susceptibility to predation in corals of compromised condition

Peer J (2.1)

A. J. Bright, C. M. Cameron, and **M. W. Miller (NMFS/SEFSC)**

- The paper illustrates the likely synergistic effect of predation on ESA-listed corals with other types of physical and disease disturbance.
- This information relates directly to ESA Recovery Actions such as predator control and better understanding disease dynamics.

The marine gastropod, *Coralliophila abbreviata*, is an obligate corallivore that causes substantial mortality in Caribbean *Acropora* spp. Considering the imperiled status of *Acropora cervicornis* and *A. palmata*, a better understanding of ecological interactions resulting in tissue loss may enable more effective conservation strategies. We examined differences in susceptibility of *A. cervicornis* to *C.*



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

abbreviata predation based on coral tissue condition. Coral tissue condition was a strong determinant of snail prey choice, with snails preferring *A. cervicornis* fragments that were diseased or mechanically damaged over healthy fragments. Generally, snails showed no preference between a healthy prey fragment and a non-feeding conspecific, despite a limited number of observations suggesting a strong preference for fragments undergoing active predation by a conspecific over an undisturbed fragment. These results indicate that the condition of *A. cervicornis* prey influenced foraging behavior of *C. abbreviata*, creating a potential feedback that may exacerbate damage from predation in coral populations compromised by other types of disturbance.

Expected publication date: September 2015

Quantifying the trophic importance of Gulf Menhaden Brevoortia patronus within the northern Gulf of Mexico ecosystem

Marine and Coastal Fisheries (1.81)

S. R. Sagarese (SEFSC), M. A. Nuttall, T. M. Geers, M. V. Lauretta, J. F. Walter III, and J. E. Serafy

- This investigation is the most comprehensive examination to date (568 diet studies considered) of the body of quantitative empirical information linking gulf menhaden to their piscine, avian and mammalian predators in northern Gulf of Mexico waters.
- Gulf menhaden is the target of the second largest fishery (in terms of catch biomass) in the nation -- this analysis quantifies the degree to which a wide diversity of predators depend on gulf menhaden for food.
- The statistically derived diet matrix generated has utility in the parameterization of an updated trophic model of the northern GOM, which will allow simulation of changes in ecosystem structure in response to changing fishing pressures.
- This work is relevant to questions surrounding the use of fishing effort reduction as tool for restoring living marine resources affected by the Deepwater Horizon oil spill.

The Gulf Menhaden, *Brevoortia patronus*, is frequently cited as playing a predominant role in the trophic structure and function of the northern Gulf of



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

Mexico (GOM) marine ecosystem; yet, much work remains in quantifying its ecological importance. We perform a meta-analysis of diet studies to quantify the trophic role of Gulf Menhaden within this ecosystem. Of 568 references consulted, 136 identify predator-prey interactions involving Gulf Menhaden, *Brevoortia spp.*, or unidentified clupeid prey items. A total of 79 species were reported to consume menhaden, with no significant difference detected between the Atlantic Ocean and the GOM in the mean occurrence of *Brevoortia spp.* in predator stomachs (Mann-Whitney U-test, P-value = 0.269). A probabilistic approach was employed on the basis of maximum likelihood estimation to quantify trophic interactions within the northern GOM, with a focus on the trophic role of Gulf Menhaden. The estimated dietary contribution of identifiable menhaden to all predators generally ranged between 2% and 3%, with the largest contribution identified for Blacktip Shark *Carcharhinus limbatus* (8%) and lower estimates (<2%) obtained for oceanic species including sharks, billfish, and tunas. When diet compositions were corrected for unidentified prey by the proportion of fish species biomass in the ecosystem, five predators showed a relatively large dependence on menhaden prey: juvenile King Mackerel *Scomberomorus cavalla*, juvenile Spanish Mackerel *S. maculatus*, adult Spanish Mackerel, Red Drum *Sciaenops ocellatus*, and Blacktip Shark. The quantification of trophic linkages and key predators identified herein is fundamental to future ecosystem modeling efforts within the northern GOM.

Acceptance date: 3 September 2015

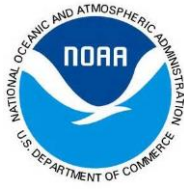
Changes and trends in the overexploited fish assemblages of two fishing grounds of the North Atlantic

ICES Journal of Marine Science (2.525)

A. N. Gassent, D. Gonzalez-Troncoso, and **N. Tolimieri (NMFS/NWFSC)**

- Delineates assemblage structure of fishes in the on the Southern Grand Banks and Flemish Cap.
- Knowledge of assemblage structure helps to inform multi species management and especially bycatch management.

An ecosystem approach is widely recognized as a desirable need for fisheries management. A key element is the development of indicators for the assessment of ecosystem status. We evaluated the status of two exploited marine ecosystem,



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

Southern Grand Banks of Newfoundland and Flemish Cap, using a multivariate analysis and a suit of ecological indicators. We used data obtained from two multispecies bottom trawl surveys performed by the Spanish Administration in the Southern Grand Banks (3NO Survey) from 2002 to 2014, and the EU in the Flemish Cap (3M Survey) from 1991 to 2014. We studied the dynamic of major demersal fish assemblages (38-300, 301-600, and 601-1460 m depth in 3NO; 129-250 m, 251-600 m and 601-1460 in 3M). Temporal changes and trends in fish assemblages' structure were tested using a nMDS and four indicators (Mean trophic Level, species evenness, species diversity and species richness). This study revealed the importance of calculating indicators in each assemblage and the usefulness of indices to compare areas and periods under different fishing pressure. Expected publication date: Fall 2015

Trophic ecology of Atlantic bluefin tuna (Thunnus thynnus) larvae from the Gulf of Mexico and NW Mediterranean spawning grounds: a comparative stable isotope study

PLOS One (3.534)

R. Laiz-Carrión, **T. Gerard** (NMFS/SEFSC), A. Uriarte, **E. Malca** (CIMAS), J. M. Quintanilla, B. Muhling, F. Alemany, **S. Privoznik**, **A. Shiroza** (CIMAS), **J. Lamkin** (NMFS/SEFSC), and A. Garcia

- Although both regions are typically oligotrophic, the Gulf of Mexico (GOM) waters, in general, were more productive, particularly in terms of mesozooplankton biomass. Low trophic positioning of the GOM bluefin tuna larvae (BFT) larvae suggests that they are not part of the traditional food chain from micro- and mesozooplankton to larvae.
- BFT larvae from the GOM and the Balearic Sea (MED) showed opposed ontogenetic diet shifts with growth, with a significant linear increase in $\delta^{13}\text{C}$ in MED larvae with SL, and a linear decrease in GOM larvae.
- Results suggest that the food webs and consequent larval ecology among the two spawning sites is distinct. This has implications for the effects of environmental variability and change on larval survival and recruitment among the two stocks, and on the contribution of each stock to overall population recruitment.



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

The present study uses stable isotopes of nitrogen and carbon ($\delta^{15}\text{N}$ and $\delta^{13}\text{C}$) as trophic indicators for Atlantic bluefin tuna larvae (BFT) (6–10mm standard length) in the highly contrasting environmental conditions of the Gulf of Mexico (GOM) and the Balearic Sea (MED). These regions are differentiated by their temperature regime and relative productivity, with the GOM being significantly warmer and more productive. MED BFT larvae showed the highest $\delta^{15}\text{N}$ signatures, implying an elevated trophic position above the underlying microzooplankton baseline. Ontogenetic dietary shifts were observed in the BFT larvae from the GOM and MED which indicates early life trophodynamics differences between these spawning habitats. Significant trophic differences between the GOM and MED larvae were observed in relation to $\delta^{15}\text{N}$ signatures in favor of the MED larvae, which may have important implications in their growth during their early life stages. These low $\delta^{15}\text{N}$ levels in the zooplankton from the GOM may be an indication of a shifting isotopic baseline in pelagic food webs due to diatrophic inputs by cyanobacteria. Lack of enrichment for $\delta^{15}\text{N}$ in BFT larvae compared to zooplankton implies an alternative grazing pathway from the traditional food chain of phytoplankton—zooplankton—larval fish. Results provide insight for a comparative characterization of the trophic pathways variability of the two main spawning grounds for BFT larvae.

Publication date: 30 July 2015

Available Online:

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0133406>

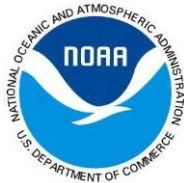
Relationships within Cladobranchia (Gastropoda: Nudibranchia) based on RNA-Seq data: An initial investigation

Royal Society Open Science (5.784)

J. A. Goodheart, A. L. Bazinet, **A. G. Collins** (NMFS/OST/NSL), and M. P. Cummings

- Elucidating biodiversity through the study of genomes.

Cladobranchia (Gastropoda: Nudibranchia) is a diverse (~1000 species) but understudied group of sea slug mollusks. In order to fully comprehend the diversity of nudibranchs and the evolution of character traits within Cladobranchia, a solid understanding of evolutionary relationships is necessary. To date, only two direct



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

attempts have been made to understand the evolutionary relationships within Cladobranchia, neither of which resulted in well-supported phylogenetic hypotheses. In addition to these studies, several others have addressed some of the relationships within this clade while investigating the evolutionary history of more inclusive groups (Nudibranchia and Euthyneura). However, all of the resulting phylogenetic hypotheses contain conflicting topologies within Cladobranchia. In the present study, we address some of these long-standing issues regarding the evolutionary history of Cladobranchia using RNA-Seq data (transcriptomes). We sequenced 16 transcriptomes, and combined these with four transcriptomes from the NCBI Sequence Read Archive (SRA). Transcript assembly using Trinity and orthology determination using HaMStR yielded 839 orthologous groups for analysis. These data provide a well-supported and almost fully resolved phylogenetic hypothesis for Cladobranchia. Our results support the monophyly of Cladobranchia and the sub-clade Aeolidida, but reject the monophyly of Dendronotida.

Accepted: 1 September 2015

Precipitation as a driver of phytoplankton ecology in coastal waters: A climatic perspective

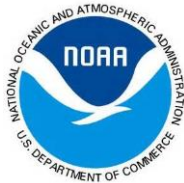
Estuarine, Coastal and Shelf Science (2.057)

P. A. Thompson, **T. D. O'Brien (NMFS/OST)**, H. W. Paerl, B. L. Peierls, P. J. Harrison, and M. Robb

Estuarine ecosystems are important nursery and food resource for marine fish species, and are subject to multiple anthropogenic and climatic pressures that can impact their health and productivity.

- This study looks at phytoplankton responses to changes in long term precipitation trends in estuarine ecosystems.
- The level of human or climatic impact depends on the climatic status (wetter vs drier, warming vs cooling) of the system(s) being impacted.

Climatic change is shaping our planet's ecosystems yet our capacity to predict the consequences and prepare for the future remains rudimentary. Changes to the hydrological cycle mean that large regions of the planet are experiencing changes in precipitation. Responses by phytoplankton were assessed in three regions: 1)



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

globally, 2) in regions that are wet and getting wetter, 3) in regions that are dry and getting drier. Using long-term time-series data the temporal variation in precipitation was compared with variation in chlorophyll a, diatoms, dinoflagellates, chlorophytes, chrysophytes and euglenophytes from 106 sites worldwide. The results demonstrate that phytoplankton responses to precipitation depend upon the season and region. In general phytoplankton responded more positively to increased precipitation during summer rather than winter. Increased precipitation during winter was likely to reduce chlorophyll a, diatoms and chrysophytes, whereas increasing precipitation in summer was likely to increase chlorophyll a and favor chlorophytes. Within regions that are wet and getting wetter chlorophyll a increased and dinoflagellate abundances were reduced in wet autumns; while diatom abundances were reduced in wet springs. In dry and drying ecosystems the abundances of chlorophytes decreased during dry springs and summers. The existence of these widespread patterns of phytoplankton abundance associated with inter annual variability in precipitation improves our capacity to predict the future composition of phytoplankton communities in estuarine and coastal water bodies.

Expected publication date: September 2015

Available online:

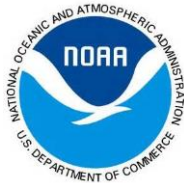
<http://www.sciencedirect.com/science/article/pii/S0272771415001286>

Genome-wide investigation of adaptation to harmful algal blooms in common bottlenose dolphins (Tursiops truncatus)

Molecular Ecology (5.84)

K. M. Cammen, T. F. Schultz, **P. E. Rosel (NMFS/SEFSC)**, R. S. Wellsc, and A. J. Read

- The study may have identified genetic loci in common bottlenose dolphins (*Tursiops truncatus*) that show correlation with resistance to brevetoxin.
- Some loci associated with survival showed patterns suggesting a common genetic-based mechanism of resistance to brevetoxins in bottlenose dolphins along the Gulf coast of Florida; other loci patterns suggested regionally specific mechanisms of resistance that may reflect differences among HABs.



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

- Next-generation sequencing methods, specifically RAD-sequencing, can be applied successfully to non-model organisms.

Harmful algal blooms (HABs), which can be lethal in marine species and cause illness in humans, are increasing worldwide. In the Gulf of Mexico, HABs of *Karenia brevis* produce neurotoxic brevetoxins and cause large-scale marine mortality events. The long history of such blooms, combined with the potentially severe effects of exposure, may have produced a strong selective pressure for evolved resistance. Advances in next-generation sequencing, in particular genotyping-by-sequencing, greatly enable the genomic study of adaptation in natural populations. We used restriction site-associated DNA (RAD) sequencing to investigate brevetoxicosis resistance in common bottlenose dolphins (*Tursiops truncatus*). To improve our understanding of the epidemiology and aetiology of brevetoxicosis and the potential for evolved resistance in an upper trophic level predator, we sequenced pools of genomic DNA from dolphins sampled from both coastal and estuarine populations in Florida and during multiple HAB-associated mortality events. We sequenced 129,594 RAD loci and analysed 7,431 single nucleotide polymorphisms (SNPs). The allele frequencies of many of these polymorphic loci differed significantly between live and dead dolphins. Some loci associated with survival showed patterns suggesting a common genetic-based mechanism of resistance to brevetoxins in bottlenose dolphins along the Gulf coast of Florida, but others suggested regionally specific mechanisms of resistance or reflect differences among HABs. We identified candidate genes that may be the evolutionary target for brevetoxin resistance by searching the dolphin genome for genes adjacent to survival-associated SNPs.

Accepted: 17 August 2015

Evaluating trophic and non-trophic effects of shellfish aquaculture in a coastal estuarine food web

ICES Journal of Marine Science (2.525)

B. Ferriss, J. C. P. Reum, P. Sean McDonald, D. Farrell, and C. J. Harvey
(NMFS/NWFSC)

- This paper outlines the capacity for increased shellfish aquaculture, particularly of geoducks, in Central Puget Sound.



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

- Simulates potential indirect effects of increased geoduck aquaculture on the nearshore and broader food webs of Central Puget Sound.

Expansion of the shellfish aquaculture industry has the potential to affect the structure and dynamics of coastal estuarine food webs. To better understand food web tradeoffs, we incorporated both trophic and non-trophic interactions (e.g., habitat facilitation, predator refuge) into a food web model of central Puget Sound to predict the effects of an increase in geoduck (*Panopea generosa*) aquaculture. At a basin-scale, the food web can support at least 120% increased geoduck aquaculture, above current production levels (landings of 10,546 kg in 2012), with only minor changes in individual species' biomass and/or metrics of ecosystem resilience. The non-trophic effects of increased geoduck aquaculture, related to the influence of anti-predator structure, had a stronger influence on the food web than the trophic role of cultured geoducks as filter feeders and prey to other species. Increased geoduck culture caused substantial increases in biomass densities of surf perch, nearshore demersal fish, and small crabs, and decreases in seabirds, flatfish, and certain invertebrates (e.g., predatory gastropods and small crustaceans). This study identifies species that should be a priority for additional empirical research and monitoring related to bivalve aquaculture interactions, including demersal fish, small crustaceans, and seabirds. It also provides insights into the benefits and challenges of incorporating habitat-related data into a food web model. Understanding these relationships can inform management decisions by clarifying tradeoffs in ecosystem functions and services in Puget Sound and facilitates estimation of direct and cumulative effects of bivalve aquaculture at a food web scale.

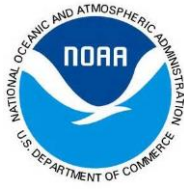
Accepted: 8 September 2015

Expected publication date: Fall 2015

Changes in size composition and relative abundance of fishes in Central California after a decade of spatial fishing closures

CA Cooperative Oceanic Fisheries Investigations (CalCOFI) Reports (1.120)

C. Marks, R. Fields, **J. Field**, **R. Miller**, **S. Beyer**, **S. Sogard** (NMFS/SWFSC),
D. Wilson-Vandenberg, D. Howard, and R. Starr



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

- The authors compared recent catch rates, species compositions and length frequencies of fishes inside and outside Rockfish Conservation Areas (RCAs).
- Demonstrates high relative abundance of many recreationally important species that are not sampled by bottom trawl surveys, many of which have not been subject to stock assessments.
- The authors found modest differences in both size composition and catch rates inside versus outside of closed RCAs, suggesting that increases are largely a consequence of both declining harvest rates and improved recruitment.

Rockfish Conservation Areas (RCAs) were implemented in 2000 to 2003 along the west coast of the United States to reduce fishing mortality on rockfish (*Sebastes* spp.) and other groundfish species that had recently been declared overfished. In 2012, we initiated a study to compare recent catch rates, species compositions and length frequencies of fishes inside and outside the RCAs with data collected in central California between 1995 and 1998. At all sites surveyed, total catch rates from the new surveys (2012–2014) were significantly higher than catch rates from before RCA implementation (1995–1998). The majority of the differences were due to the increased relative abundance of Yellowtail Rockfish (*Sebastes flavidus*), although other species, including the overfished Canary Rockfish (*Sebastes pinniger*), also increased. Differences in the size composition of species between the two time periods reflected both the increased survival of older fishes and higher recruitment success in the past decade.

Accepted: 4 September 2015

Expected publication date: December 2015

Making landfall: linkages between fishing communities and support services

Coastal Management (1.748)

K. Kent (NMFS/AKRO) and A. Himes-Cornell (NMFS/AKFSC)

- The link between fisheries, communities, and support service businesses is an important one that needs to be recognized as a component of community fisheries activity that may be impacted by changes in fisheries management.



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The relationship between the fishing industry and the fisheries-related support service sector creates economic benefits for communities through strong backward linkages and induced or multiplier effects. The support service sector is embedded within fishing communities where the impacts of fisheries management changes are perpetuated. This paper examines the potential for such impacts by evaluating the diversity of fishing gear use, ex-vessel revenue, presence of processing plants, public moorage, and haul-out or tidal grids, and the number of vessels in a community, in relation to the availability of support services. The results show that the presence of a processor and haul-out facilities in a community significantly affects the number of support service businesses; however, there is not a strong association with the number of vessels or ex-vessel revenue. One hypothesis is that fishermen often travel to other communities to obtain services. We evaluate this hypothesis using social network analysis to evaluate transfers of revenue for fishery-related goods and services. Ultimately, this informs the exploration of the importance of support service businesses and fishery-support infrastructure to the continued well-being of fishing communities.

Accepted: 13 September 2015

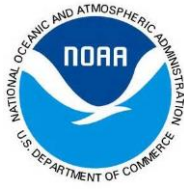
Expected publication date: Early 2016

A novel mode of embryonic nutrition in the tiger shark, Galeocerdo cuvier
Marine Biology Research (1.475)

J. I. Castro (NMFS/SEFSC), K. Sato, and A. B. Bodine

- A new mode of reproduction is described for a common, commercially important shark species, the tiger shark (*Galeocerdo cuvier*).

How are tiger shark embryos nourished to large size without a placental connection? Tiger sharks belong to the family Carcharhinidae, and all carcharhinid sharks are placental with the exception of the tiger shark. The aim of this study was to test the hypothesis that tiger shark embryos are nourished to large size by imbibing a clear uterine fluid found in their egg cases. Based on weights of fertilized eggs and of term embryos, the tiger shark is a matrotrophic species, and its embryos appear to reach gains of 2,119% in wet weight and 1092% in dry weight during gestation. By measuring the total energy content of the fluid in the egg case by chemical oxygen demand (COD), the authors demonstrate that clear



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

liquid in the tiger shark egg case is an energy-rich embryotrophe that nourishes the embryos to large size. We suggest that the process be termed “embryotrophy.” The process appears to be an adaptation for producing large broods of large embryos in a species lacking a placental connection.

Accepted: 15 September 2015

An assessment of phytoplankton primary productivity in the Arctic Ocean from satellite ocean color/in situ chlorophyll-a based models

Journal of Geophysical Research: Oceans (3.44)

Y. Lee, P. Matrai, M. Friedrichs, **V. S. Saba** (NMFS/NEFSC), D. Antoine, M. Ardyna, I. Asanuma, M. Babin, S. Bélanger, M. Benoit-Gagné, E. Devred, M. Fernández-Méndez, B. Gentili, T. Hirawake, S.-H. Kang, T. Kameda, C. Katlein, S. Lee, Z. Lee, F. Mélin, M. Scardi, T. Smyth, S. Tang, K. Turpie, K. Waters, and T. Westberry

- We assessed the skill of 32 ocean color models that estimate marine primary production in the Arctic Ocean, a region undergoing rapid change due to climate change.
- The models were most sensitive to uncertainties in surface chlorophyll, generally performing better with in situ chlorophyll than with satellite-derived values.
- NPP models need to be carefully tuned for the Arctic Ocean because most of the models performing relatively well were those that used Arctic-relevant parameters.

We investigated 32 net primary productivity (NPP) models by assessing skills to reproduce integrated NPP in the Arctic Ocean. The models were provided with two sources each of surface chlorophyll-a concentration (chlorophyll), photosynthetically available radiation (PAR), sea surface temperature (SST), and mixed-layer depth (MLD). The models were most sensitive to uncertainties in surface chlorophyll, generally performing better with in situ chlorophyll than with satellite-derived values. They were much less sensitive to uncertainties in PAR, SST, and MLD, possibly due to relatively narrow ranges of input data and/or relatively little difference between input data sources. Regardless of type or complexity, most of the models were not able to fully reproduce the variability of



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

in situ NPP, whereas some of them exhibited almost no bias (i.e., reproduced the mean of in situ NPP). The models performed relatively well in low-productivity seasons as well as in sea ice-covered/deep-water regions. Depth-resolved models correlated more with in situ NPP than other model types, but had a greater tendency to overestimate mean NPP whereas absorption-based models exhibited the lowest bias associated with weaker correlation. The models performed better when a subsurface chlorophyll-a maximum (SCM) was absent. As a group, the models overestimated mean NPP, however this was partly offset by some models underestimating NPP when a SCM was present. Our study suggests that NPP models need to be carefully tuned for the Arctic Ocean because most of the models performing relatively well were those that used Arctic-relevant parameters.

Expected publication date: October 2015

Available online: <http://onlinelibrary.wiley.com/doi/10.1002/2015JC011018/epdf>

Long distance migration of prey synchronizes demographic rates of top oceanic predators

Journal of Animal Ecology (4.504)

E. J. Ward, M. E. Dahlheim, J. Waite, **C. K. Emmons**, **K. N. Marshall**, B. Chasco, and K. C. Balcomb III (NMFS/NWFSC)

- Following on previous work that has shown correlations between populations of killer whales (Southern and Northern Residents), we show similar high correlations exist between Southern and Southeast Alaskan residents.

Reproductively and geographically isolated predator populations may be synchronized by common responses to external processes, such as climate, density dependence (parasites, disease), or prey. Prey species with greater migrations than the predator populations that eat them also may synchronize isolated populations of predators. The objective of our study was to investigate evidence for correlations of demographic rates between geographically isolated populations of piscivorous killer whales in the Northeast Pacific. Using long-term mark-recapture datasets collected over the last 30+ years, we constructed a hierarchical occupancy model, linking models of survival and fecundity in a single framework. We allowed demographic rates to vary over time and potentially be correlated both within and



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

between populations. We found strong support for differences in demographic rates between Southeast Alaskan and Southern Resident killer whales, which are geographically and reproductively isolated. We found that though these populations are isolated, they experience extremely correlated dynamics – the correlation in fecundity rates between populations exceeds 0.9. The correlation in demographic rates across populations of killer whales in the Northeast Pacific that don't overlap spatially suggests they are synchronized by a common driver. The long distance coastal migration patterns of prey (in particular Chinook salmon) is even greater than the migration patterns of killer whales. Thus, isolated killer whales be synchronized by consuming prey from the same populations of origin, just at slightly different times.

Expected publication date: Fall 2015

The rapid return of marine-derived nutrients to a freshwater food web following a century of damming

Conservation Biology (4.32)

C. M. Tonra, K. A. Sager-Fradkin, **S. A. Morley (NMFS/NWFSC)**, J. J. Duda, and P. P. Mara

- Dam removal is becoming a more common river restoration action.
- Little is known on how terrestrial populations respond to dam removal.
- Less than a year after the Elwha Dam was removed, marine-derived nutrients from anadromous fish increased in American dippers (*Cinclus mexicanus*).

Dam removal is increasingly being recognized as a viable river restoration action. Although the main beneficiaries of restored connectivity are often migratory fish populations, little is known regarding recovery of other parts of the freshwater food web, particularly terrestrial components. We measured stable isotopes in key components to the freshwater food web: salmon, freshwater macroinvertebrates and a river specialist bird, American dipper (*Cinclus mexicanus*), before and after removal of the Elwha Dam, WA, USA. Less than a year after dam removal, salmon returned to the system and released marine-derived nutrients (MDN). In that same year we documented an increase in stable-nitrogen and carbon isotope ratios in American dippers. These results indicate that MDN from anadromous



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

fish, an important nutrient subsidy that crosses the aquatic-terrestrial boundary, can return rapidly to food webs after dams are removed which is an important component of ecosystem recovery.

Expected publication date: Winter 2015

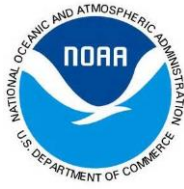
Variability in haul seine retention rates and its effects on abundance and size structure estimates of Black Crappie and Sunfish populations

Journal of Southeastern Association of Fish and Wildlife Agencies (N/A)

T. Tuten, A. C. Dutterer, K. G. Johnson, E. J. Nagid, and **M. V. Lauretta**
(NMFS/SEFSC)

- Current assessment methods for recreationally important freshwater sport fishes demonstrated bias when model assumptions were empirically tested.
- Variability in gear catchability was predominant and is a key source of bias in assessment models.

Gear catch efficiencies have a large effect on data collected to describe fish populations and communities used by managers to make informed decisions. The authors measured the retention rate of black crappie (*Pomoxis nigromaculatus*) and sunfish (*Lepomis* spp.) from a seeding experiment composed of 10 haul seines pulled at three lakes. Approximately 50 individuals of each group were marked and placed into closed haul seines, and fish recovery rates were measured. Retention rates ranged between 0.34 and 0.94 for black crappie and 0.38 and 0.89 for sunfish. Akaike's Information Criterion was used to select between alternative generalized linear models of recapture probability using site-specific environmental and sampling measurements as covariates. Our top ranked model for black crappie incorporated heterogeneity in fish retention across lakes with different sample area sizes, while the best model for sunfish included covariates for lake, size of sample area, and sample effort. Nonparametric bootstrap (with replacement) estimates of mean retention rate across sites were 0.57 (90% confidence interval [CI]=0.48–0.66) for black crappie and 0.63 (90% CI=0.55–0.71) for sunfish. We observed increased retention rates of larger fish for both groups, indicating higher capture probabilities. This information may be useful for adjusting haul seine catches used to estimate absolute abundance and size structure on black crappie and sunfish populations



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

Expected publication date: August 2015

Link to full text paper:

<http://www.seafwa.org/html/journals/pdf/11%20Tuten%20et%20al%2072-79.pdf>

Molecular characterization of the gonadal kisspeptin system: cloning, tissue distribution, gene expression analysis and localization in sablefish (Anoplopoma fimbria)

General and Comparative Endocrinology (2.67)

M. R. Fairgrieve, Y. Shibata, **E. K. Smith, E. S. Hayman, and J. A. Luckenbach**
(NMFS/NWFSC)

- First study to focus on kisspeptin genes expressed in the gonads of fish.
- The kisspeptin system is classically associated with brain signaling during puberty, so this study indicates that it could also have important roles in peripheral tissues.
- Sablefish ovary exhibited the highest expression of kisspeptin 2, suggesting a role for this gene/protein in ovarian or embryonic development.

The kisspeptin system plays pivotal roles in the regulation of vertebrate reproduction. Classically, kisspeptin produced in the brain stimulates brain gonadotropin-releasing hormone signaling, which in turn activates the pituitary–gonad axis. Expression of the kisspeptin system has also been documented in peripheral tissues, including gonads of mammals and fishes. However, the fish gonadal kisspeptin system remained uncharacterized. Here, the authors report identification and characterization of four kisspeptin system mRNAs in sablefish, *Anoplopoma fimbria*. Sablefish predicted protein sequences were highly similar to those of other marine teleosts, but less so compared to freshwater teleosts. Tissue distribution analyses revealed that all four kisspeptin-system transcripts were expressed in both brain and gonad. However, one of these mRNAs - “kiss2” - was the predominant transcript in the gonads and the only transcript detected in ovulated eggs. Ontogenetic analysis of kiss2 expression in juvenile sablefish gonads demonstrated that levels were low during sex differentiation but increased with fish size and gonadal development. Dramatic increases in kiss2 mRNA occurred during primary oocyte growth, while levels remained relatively low in testes. *In situ* hybridization revealed that kiss2 mRNA was localized to cytoplasm



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

of perinucleolus stage oocytes, suggesting it could play a local role in oogenesis or could be synthesized and stored within oocytes as maternal mRNA. This represents the first study to focus on the gonadal kisspeptin system in fishes and provides important tools for further investigation of both the gonadal and brain kisspeptin systems in sablefish.

Expected publication date: Fall 2015

Isotopic signatures in the otoliths of reef-associated fishes of southern Florida: linkages between nursery grounds and coral reefs

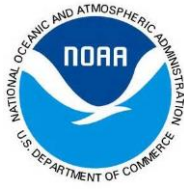
Regional Studies in Marine Science (N/A)

T. Gerard, E. Malca, B. Muhling, I. Mateo, and **J. Lamkin** (NMFS/SEFSC)

- This study investigated connections between juvenile nursery areas and nearby coral reefs in south Florida.
- Found evidence of migratory connections between juvenile and adult habitat and that specific nursery habitats contributed identified percentage of individuals sampled.
- Results indicate source regions and habitats for the successful recruitment.

Ecologically and economically important coral reef fishes are believed to migrate to reefs from juvenile nursery areas such as seagrass and mangrove habitats. However, little is known about the migration corridors that exist between nursery and coral reefs, or the timing of these migrations. This study investigated the possibility of identifying connections between juvenile nursery areas and nearby coral reef adult habitats using stable isotope analysis of the otoliths of gray snapper (*Lutjanus griseus*; n= 71) and yellowtail snapper (*Ocyurus chrysurus*; n=60), collected from 10 sites along the Florida Keys coral reef tract in 2003.

Measurements of carbon and oxygen isotope ratios were compared to existing isotopic signatures of juvenile snapper from nursery areas around southern Florida. Data showed overlap for ^{13}C and ^{18}O isotope measurements for the juvenile portion of sub-adult otoliths to isotope values for the middle and lower Florida Keys regions, thereby suggesting a migratory connection. Specific nursery habitats contributed approximately 93% of individuals sampled for yellowtail and approximately 98% for gray snapper to the Florida Keys coral reef tract. Results



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

from this study indicate locally important source regions and habitats for the successful recruitment of fish to the Florida Keys coral reef tract.

Expected publication date: November 2015

Link to full text paper:

<http://www.sciencedirect.com/science/article/pii/S2352485515000468>

Linking transcriptional responses to organismal tolerance reveals mechanisms of thermal sensitivity in a mesothermal endangered fish

Molecular Ecology (5.84)

L. M. Komoroske (NMFS/SWFSC), R. E. Cannon, K. M. Jeffries, and N. A. Fague

- This study provides evidence for need to incorporate sublethal physiological stress into management.
- The authors found that the acclimation capacity of mesothermal fishes to cope with climate change may be more limited than currently assumed.
- The study provides evidence that the underlying thermal physiology of mesothermal fishes may be different than those that can tolerate wide ranges of temperatures (which currently provides the bulk of the knowledge for the field).

Forecasting species' responses to climate change requires understanding the underlying mechanisms governing environmental stress tolerance, including acclimation capacity and acute stress responses. Current knowledge of these physiological processes in aquatic ectotherms is largely drawn from eurythermal or extreme stenothermal species. Yet many species of conservation concern exhibit tolerance windows and acclimation capacities in between these extremes. We linked transcriptome profiles to organismal tolerance in a mesothermal endangered fish, the delta smelt (*Hypomesus transpacificus*), to quantify the cellular processes, sublethal thresholds and effects of thermal acclimation on acute stress responses. Delta smelt initiated rapid molecular changes in line with expectations of theoretical thermal limitation models, but also exhibited diminished capacity to modify expression of some genes and cellular mechanisms key to coping with acute thermal stress found in eurytherms. Sublethal critical thresholds occurred 4-6°C below their upper tolerance limits, and thermal acclimation shifted the onset of



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

acute thermal stress and tolerance as predicted. However, we found evidence that delta smelt's limited thermal plasticity may be partially due to an inability of individuals to effectively make physiological adjustments to truly achieve new homeostasis under heightened temperatures, resulting in chronic thermal stress. These findings provide insight into the physiological basis of the diverse patterns of thermal tolerances observed in nature. Moreover, understanding how underlying molecular mechanisms shape thermal acclimation capacity, acute stress responses, and ultimately differential phenotypes, contributes to a predictive framework to deduce species' responses *in situ* to changes in selective pressures due to climate change.

Accepted: 20 August 2015

OAR Publications

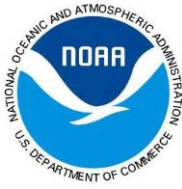
Gap winds and their effects on regional oceanography Part I: Cross Sound, Alaska.

Deep-Sea Research Part II (2.763)

C. Ladd (OAR/PMEL) and W. Cheng

- Gap-wind events flowing from Cross Sound in the eastern Gulf of Alaska (GOA) were examined using QuikSCAT wind data.
- A model experiment suggests that a gap-wind event can result in eddy formation and changes in circulation and water properties.
- Increased entrainment of water from below the mixed layer due to the gap-wind event implies that mixed-layer nitrate concentrations could increase on the order of 5–10 $\mu\text{mole/l}$, potentially enhancing primary production in the region.

The average duration of an event is 3.6 days with the longest event recorded in the QuikSCAT dataset being 12 days. Daily offshore directed winds with speeds $>10 \text{ m s}^{-1}$ are more common during the winter months (October–March), averaging 20.0 days per year, and less common during the summer (April–September), averaging 2.8 days per year. Interannual variability in the frequency of gap-wind events is correlated with El Niño. During gap-wind events, the spatial scales of high offshore directed winds ($>10 \text{ m s}^{-1}$) reach almost 200 km offshore and 225 km along the shelf break, suggesting that the winds directly influence both the



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

shelf (20–65 km wide) and the offshore waters. A model experiment suggests that a gap-wind event can result in eddy formation and changes in circulation and water properties. Increased entrainment of water from below the mixed layer due to the gap-wind event implies that mixed-layer nitrate concentrations could increase on the order of 5–10 $\mu\text{mole/l}$, potentially enhancing primary production in the region. An accompanying paper (this issue) discusses part II of our study focusing on gap-wind events in the western GOA around Kodiak Island.

Accepted: August 2015

Changes in the Lake Michigan food web following dreissenid mussel invasion
Journal of Great Lakes Research (1.77)

C. P. Madenjian, D. B. Bunnell, D. M. Warner, **S. A. Pothoven (OAR/GLERL)**,
G. L. Fahnenstiel, T. F. Nalepa, **H. A. Vanderploeg (OAR/GLERL)**, I. Tsehaye,
R. M. Claramunt, and R. D. Clark

- This paper synthesizes the effects of the invasive dreissenid mussels on the Lake Michigan food web using time series.
- Results show that despite many negative changes driven by dreissenid mussels, there has been little impact on salmonines and whitefish.

Using various available time series for Lake Michigan, researchers examined changes in the Lake Michigan food web following the dreissenid mussel invasions and identified changes most likely attributable to these invasions. Expansion of the quagga mussel (*Dreissena rostriformis bugensis*) population into deeper waters, which began around 2004, appeared to have a substantial predatory effect on both phytoplankton abundance and primary production, with annual primary production in offshore (> 50 m deep) waters being reduced by about 35% by 2007. Primary production likely decreased in nearshore waters as well, primarily due to predatory effects exerted by the quagga mussel expansion. The drastic decline in *Diporeia* abundance in Lake Michigan during the 1990s and 2000s has been attributed to dreissenid mussel effects, but the exact mechanism by which the mussels were negatively affecting *Diporeia* abundance remains unknown. In turn, decreased *Diporeia* abundance was associated with reduced condition, growth, and/or energy density in alewife (*Alosa pseudoharengus*), lake whitefish (*Coregonus clupeaformis*), deepwater sculpin (*Myoxocephalus thompsoni*), and bloater



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

(*Coregonus hoyi*). However, lakewide biomass of salmonines, top predators in the food web, remained high during the 2000s, and consumption of alewives by salmonines actually increased between the 1980-1995 and 1996-2011 time periods. Moreover, abundance of the lake whitefish population, which supports Lake Michigan's most valuable commercial fishery, remained at historically high levels during the 2000s. Apparently, counterbalancing mechanisms operating within the complex Lake Michigan food web have enabled salmonines and lake whitefish to retain relatively high abundances despite reduced primary production.
Expected publication date: Fall 2015

Shifts in bloater consumption in Lake Michigan between 1993 and 2011 and its effects on Diporeia and Mysis

Transactions of the American Fisheries Society (1.314)

S. A. Pothoven (OAR/GLERL) and D. B. Bunnell

- Bloater in Lake Michigan did not increase consumption despite declines in their abundance.
- Bioenergetics models suggest that Lake Michigan probably cannot support the same abundance of bloater as it did in the 1980s.

Bioenergetics modelling was used to determine individual and population consumption by Bloater, *Coregonus hoyi*, in Lake Michigan during three time periods with variable Bloater density: 1993-1996 (high), 1998-2002 (intermediate) and 2009-2011 (low). Despite declines in Bloater abundance between 1993 and 2011, our results did not show any density-dependent compensatory response in annual individual consumption, specific consumption, or proportion of maximum consumption consumed. *Diporeia* accounted for a steadily decreasing fraction of annual consumption, and Bloater were apparently unable to eat enough Mysis or other prey to account for the loss of *Diporeia* in the environment. The fraction of both *Diporeia* and Mysis production that was consumed by the Bloater population decreased over time so that the consumption to production ratio for Mysis + *Diporeia* was 0.65, 0.22, and 0.14 in 1993-1996, 1998-2002, and 2009-2011 respectively. Although high Bloater numbers in the 1980s-1990s clearly had an influence on *Diporeia* populations, Bloater were probably not the main factor driving *Diporeia* to a nearly complete disappearance, because *Diporeia* continued



NOAA SCIENTIFIC PUBLICATIONS REPORT
SEPTEMBER 28, 2015

to decline when Bloater predation demands were lessening. Thus, there appears to be a decoupling in the inverse relationship between predator and prey abundance in Lake Michigan. Compared to Alewife *Alosa pseudoharengus*, the other dominant planktivore in the lake, Bloater have a lower specific consumption and higher gross conversion efficiency, indicating the lake can support a higher biomass of Bloater than Alewife. However, declines in Bloater gross conversion efficiency since the 1970s and the absence of positive responses in consumption variables following declines in abundance suggest that Lake Michigan might not be able to support the same biomass of Bloater as in the past.

Expected publication date: Fall 2015

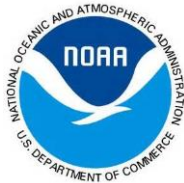
High-resolution water column survey to identify active sublacustrine hydrothermal discharge zones within Lake Rotomahana, North Island, New Zealand

Journal of Volcanology and Geothermal Research (2.543)

S. L. Walker (OAR/PMEL), C. E. J. de Ronde, D. Fornari, M. A. Tivey, and V. K. Stucker

- Five zones of active hydrothermal venting were located beneath Lake Rotomahana. Active venting continues at historic location of Pink Terraces, plus 4 new areas.
- Temperature, pH, ORP, and turbidity anomalies at sites vary over short distances and sites are correlated with high conductive heat flux, bubble plumes, and basalt dikes.
- The lake received a sudden pulse of excess heat in response to an earthquake swarm in 2011.

Autonomous underwater vehicles were used to conduct a high-resolution water column survey of Lake Rotomahana using temperature, pH, turbidity, and oxidation–reduction potential (ORP) to identify active hydrothermal discharge zones within the lake. Five areas with active sublacustrine venting were identified: (1) the area of the historic Pink Terraces; (2) adjacent to the western shoreline subaerial “Steaming Cliffs,” boiling springs and geyser; (3) along the northern shoreline to the east of the Pink Terrace site; (4) the newly discovered Patiti hydrothermal system along the south margin of the 1886 Tarawera eruption rift zone; and (5) a location in the east basin (northeast of Patiti Island). The Pink



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

Terrace hydrothermal system was active prior to the 1886 eruption of Mount Tarawera, but venting along the western shoreline, in the east basin, and the Patiti hydrothermal system appear to have been initiated in the aftermath of the eruption, similar to Waimangu Valley to the southwest. Different combinations of turbidity, pH anomalies (both positive and negative), and ORP responses suggest vent fluid compositions vary over short distances within the lake. The seasonal period of stratification limits vertical transport of heat to the surface layer and the hypolimnion temperature of Lake Rotomahana consequently increases with an average warming rate of ~ 0.010 °C/day due to both convective hydrothermal discharge and conductive geothermal heating. A sudden temperature increase occurred during our 2011 survey and was likely the response to an earthquake swarm just 11 days prior.

Publication date: 12 August 2015

Available online:

<http://www.sciencedirect.com/science/article/pii/S0377027315002541>

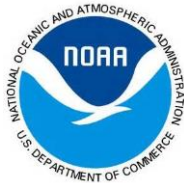
A review of the remote sensing of lower tropospheric thermodynamic profiles and its indispensable role for the understanding and the simulation of water and energy cycles

Review of Geophysics (12.364)

V. Wulfmeyer, R. M. Hardesty, **D. D. Turner (OAR/NSSL)**, A. Behrendt, M. P. Cadeddu, P. Di Girolamo, P. Schlüssel, J. Van Baelen, and F. Zus

- This is a review article on measuring water vapor in the lower troposphere.
- The article first reviews many applications to understand the level of accuracy and resolution in the water vapor measurements that is needed.
- It then presents the currently available technologies, outlining their basic approach to measuring water vapor, and detailing the accuracy and resolution of the different technologies.

A review of remote sensing technology for lower tropospheric thermodynamic (TD) profiling is presented with focus on high accuracy and high temporal-vertical resolution. The contributions of these instruments to the understanding of the Earth system are assessed with respect to radiative transfer, land surface-atmosphere feedback, convection initiation, and data assimilation. We demonstrate that for



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

progress in weather and climate research, TD profilers are essential. These observational systems must resolve gradients of humidity and temperature in the stable or unstable atmospheric surface layer close to the ground, in the mixed layer, in the interfacial layer—usually characterized by an inversion—and the lower troposphere. A thorough analysis of the current observing systems is performed revealing significant gaps that must be addressed to fulfill existing needs. We analyze whether current and future passive and active remote sensing systems can close these gaps. A methodological analysis and demonstration of measurement capabilities with respect to bias and precision is executed both for passive and active remote sensing including passive infrared and microwave spectroscopy, the global navigation satellite system, as well as water vapor and temperature Raman lidar and water vapor differential absorption lidar. Whereas passive remote sensing systems are already mature with respect to operational applications, active remote sensing systems require further engineering to become operational in networks. However, active remote sensing systems provide a smaller bias as well as higher temporal and vertical resolutions. For a suitable mesoscale network design, TD profiler system developments should be intensified and dedicated observing system simulation experiments should be performed.

Publication date: 27 August 2015

Available online: <http://onlinelibrary.wiley.com/doi/10.1002/2014RG000476/full>

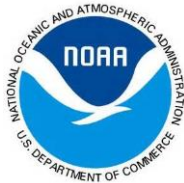
Micro-CT analysis of the Caribbean octocoral Eunicea flexuosa subjected to elevated pCO₂

ICES Journal of Marine Science (2.525)

I. Enochs, D. Manzello, H. Wishing, R. Carlton, and J. Serafy (OAR/AOML)

- The authors demonstrated that there was no significant impact of high CO₂ in soft corals, which may be because the sclerites are enveloped in a proteinaceous matrix that keeps them isolated from seawater.
- This was the first time micro-computed tomography was utilized to determine if high CO₂ conditions impacted the growth of calcium carbonate structural elements, termed spicules or sclerites, in soft corals.

Rising anthropogenic carbon dioxide has resulted in a drop in ocean pH, a phenomenon known as ocean acidification (OA). These acidified waters have



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

many ramifications for diverse marine biota, especially those species which precipitate calcium carbonate skeletons. The permanence of coral reef ecosystems is therefore closely related to OA stress as habitat-forming corals will exhibit reduced calcification and growth. Relatively little is known concerning the fate of other constituent taxa which may either suffer concomitant declines or be competitively favoured in acidified waters. Here, we experimentally (49 d) test the effects of next century predictions for OA ($\text{pH} = 7.75$, $p\text{CO}_2 = 1081 \mu\text{atm}$) vs. near-present-day conditions ($\text{pH} = 8.01$, $p\text{CO}_2 = 498 \mu\text{atm}$) on the common Caribbean octocoral *Eunicea flexuosa*. We measure linear extension of this octocoral and use a novel technique, high-resolution micro-computed tomography, to measure potential differences in the morphology of calcified internal skeletal structures (sclerites) in a 2 mm apical section of each branch. Despite the use of highly accurate procedures, we found no significant differences between treatments in either the growth of *E. flexuosa* branches or the structure of their sclerites. Our results suggest a degree of resilience to OA stress and provide evidence that this octocoral species may persist on Caribbean coral reefs, despite global change.

Publication date: 12 September 2015

Available online:

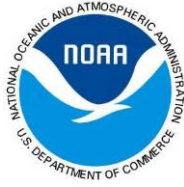
<http://icesjms.oxfordjournals.org/content/early/2015/09/12/icesjms.fsv159.short?rs=s=1>

The melting Arctic and mid-latitude weather patterns: Are they connected?

Journal of Climate (4.904)

J. E. Overland (OAR/PMEL), J. Francis, R. Hall, E. Hanna, S. J. Kim, and T. Vihma

- The potential of recent Arctic changes to influence hemispheric weather is a complex and controversial topic with considerable uncertainty, as time series of potential linkages are short (<10 years) and understanding involves the relative contribution of direct forcing by Arctic changes on a chaotic climatic system.
- A potential way forward is through further investigation of atmospheric dynamic mechanisms.



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

During several exceptionally warm Arctic winters since 2007, sea-ice loss in the Barents/Kara Seas initiated eastward-propagating wave trains of high and low pressure. Anomalous high pressure east of the Ural Mountains advected Arctic air over central and eastern Asia, resulting in persistent cold spells. Blocking near Greenland related to low-level temperature anomalies led to northerly flow into eastern North America, inducing persistent cold periods. Potential Arctic connections in Europe are less clear. Variability in the North Pacific can reinforce downstream Arctic changes, and Arctic amplification can accentuate the impact of Pacific variability. Here, the authors emphasize multiple linkage mechanisms that are regional, episodic, and based on amplification of existing jet-stream wave patterns, which are the result of a combination of internal variability, lower-tropospheric temperature anomalies, and mid-latitude teleconnections. The quantitative impact of Arctic change on mid-latitude weather may not be resolved within the foreseeable future, yet new studies of the changing Arctic and subarctic low frequency dynamics, together with additional Arctic observations, can contribute to improved skill in extended-range forecasts as planned by the WMO Polar Prediction Program (PPP).

Accepted: 29 July 2015

Available online: <http://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-14-00822.1>

NWS Publications

Diagnosing the conditional probability of tornado damage rating using environmental and radar attributes

Weather and Forecasting (1.860)

B. T. Smith, R. L. Thompson, A. R. Dean, and P. T. Marsh

(NWS/NCEP/Storm Prediction Center)

- This paper examines the relationship between the atmospheric environment, radar signatures, and tornadoes
- Possible applications of these findings include using the conditional probability of tornado intensity as a real-time situational awareness tool

Radar-identified convective modes, peak low-level rotational velocities, and near-storm environmental data were assigned to a sample of tornadoes reported in the contiguous United States during 2009–2013. The tornado segment data were



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

filtered by the maximum enhanced Fujita (EF)-scale tornado event per hour using a 40-km horizontal grid. Convective mode was assigned to each tornado event by examining full volumetric Weather Surveillance Radar-1988 Doppler data at the beginning time of each event, and 0.5° peak rotational velocity (V_{rot}) data were identified manually during the lifespan of each tornado event. Environmental information accompanied each grid-hour event, consisting primarily of supercell-related convective parameters from the hourly objective mesoscale analyses calculated and archived at the Storm Prediction Center. Results from examining environmental and radar attributes, featuring the significant tornado parameter (STP) and 0.5° peak V_{rot} data, suggest an increasing conditional probability for greater EF-scale damage as both STP and 0.5° peak V_{rot} increase, especially with supercells. Possible applications of these findings include using the conditional probability of tornado intensity as a real-time situational awareness tool.

Accepted: 22 April 2015

Link to full text paper: <http://journals.ametsoc.org/doi/full/10.1175/WAF-D-14-00122.1>

Cross Line Office Publications

A proposed revision to the definition of “derecho”

Weather and Forecasting (1.86)

S. Corfidi, A. Cohen (NWS/Storm Prediction Center), M. Coniglio (OAR/NSSL), and C. Mead (NWS/Storm Prediction Center)

- The proposed definition is considered to be the beginning of a greater effort to classify and define wind-producing severe convective weather events based on the underlying meteorological processes involved.

The word “derecho” was first used by Gustavus Hinrichs in 1888 to distinguish the widespread damaging windstorms that occurred on occasion over the mid-Mississippi Valley region of the United States from damaging winds associated with tornadoes. The term soon fell into disuse, however, and did not appear in the literature until Robert Johns and William Hirt resurrected it in the mid-1980s. While the present definition of “derecho” served well during the early years of the term’s re-introduction to the meteorological community, it has several



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

shortcomings. These have become more apparent in recent years as various studies shed light on the physical processes responsible for the production of widespread damaging winds. In particular, the current definition's emphasis on the coverage of storm reports at the expense of identifying the convective structures and physical processes deemed responsible for the reports has led to the term being applied to wind events beyond those for which it originally was intended. The revised definition of a derecho proposed herein is intended to focus more specifically on those types of windstorms that are the most damaging and potentially life-threatening because of their intensity, sustenance, and degree of organization. The proposal is not intended to be final or all-encompassing, but rather an initial step toward ultimately realizing a more complete physically based taxonomy that also addresses other forms of damaging-wind-producing convective systems.

Expected publication date: Early-mid 2016

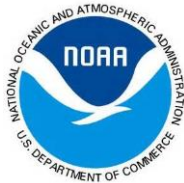
Available online: <http://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-14-00254.1>

Phylogenomic analyses support traditional relationships within Cnidaria
PLoS ONE (3.534)

F. Zapata, F. E. Goetz, **S. A. Smith (OAR/PMEL)**, M. Howison, S. Siebert, S. H. Church, S. M. Sanders, C. L. Ames, C. S. McFadden, S. C. France, M. Daly, **A. G. Collins (NMFS/S&T)**, S. H.D. Haddock, C. W. Dunn, and P. Cartwright

- This paper examines phylogenetic relationships among cnidarian lineages.
- Results support traditional views on cnidarian lineages.

Cnidaria, the sister group to Bilateria, is a highly diverse group of animals in terms of morphology, lifecycles, ecology, and development. How this diversity originated and evolved is not well understood because phylogenetic relationships among major cnidarian lineages are unclear and recent studies present contrasting phylogenetic hypotheses. Here, researchers use transcriptome data from 15 newly-sequenced species in combination with 26 publicly available genomes and transcriptomes to assess phylogenetic relationships among major cnidarian lineages. Phylogenetic analyses using different partition schemes and models of molecular evolution, as well as topology tests for alternative phylogenetic



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

relationships, support the monophyly of Medusozoa, Anthozoa, Octocorallia, Hydrozoa, and a clade consisting of Staurozoa, Cubozoa, and Scyphozoa. Support for the monophyly of Hexacorallia is weak due to the equivocal position of Ceriantharia. Taken together, these results further resolve deep cnidarian relationships, largely support traditional phylogenetic views on relationships, and provide a historical framework for studying the evolutionary processes involved in one of the most ancient animal radiations.

Accepted: 9 September 2015

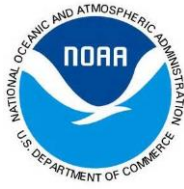
A review of planetary boundary layer parameterization schemes and their sensitivity in simulating Southeastern U.S. cold season severe weather environments

Weather and Forecasting (1.860)

A. E. Cohen (NWS/NCEP), S. M. Cavallo, M. C. Coniglio (OAR/NSSL), and H. E. Brooks (OAR/NSSL)

- Provides background information on the variety of Planetary Boundary Layer (PBL) parameterization schemes from which modelers can choose in designing high-resolution numerical models.
- Potentially this research will lead to more relevant choices for particular meteorological regimes.
- This study is particularly tailored to the regime of southeast United States severe storm environments in the cold season and provides analyses and evaluation of PBL scheme performance.

The representation of turbulent mixing within the lower troposphere is needed to accurately portray the vertical thermodynamic and kinematic profiles of the atmosphere in mesoscale model forecasts. For mesoscale models, turbulence is mostly a subgrid-scale process, but its presence in the PBL can directly modulate a simulation's depiction of mass fields relevant for forecast problems. The primary goal of this work is to review the various parameterization schemes that the Weather Research and Forecasting Model employs in its depiction of turbulent mixing (PBL schemes) in general, and is followed by an application to a severe weather environment. Each scheme represents mixing on a local and/or nonlocal basis. Local schemes only consider immediately adjacent vertical levels in the



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

model, whereas nonlocal schemes can consider a deeper layer covering multiple levels in representing the effects of vertical mixing through the PBL. As an application, a pair of cold season severe weather events that occurred in the southeastern United States are examined. Such cases highlight the ambiguities of classically defined PBL schemes in a cold season severe weather environment, though characteristics of the PBL schemes are apparent in this case. Low-level lapse rates and storm-relative helicity are typically steeper and slightly smaller for nonlocal than local schemes, respectively. Nonlocal mixing is necessary to more accurately forecast the lower-tropospheric lapse rates within the warm sector of these events. While all schemes yield overestimations of mixed-layer convective available potential energy (MLCAPE), nonlocal schemes more strongly overestimate MLCAPE than do local schemes.

Expected publication date: June 2015

Link to full text paper: <http://journals.ametsoc.org/doi/pdf/10.1175/WAF-D-14-00105.1>

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NOS PUBLICATIONS

Modeling pygmy sperm whale (Kogia breviceps) strandings along the southeast coast of the United States from 1992 to 2006 in relation to environmental factors

NOAA Tech Memo

C. Berini, **L. Kracker**, and **W. McFee (NOS/NCCOS)**

- In this study generalized linear models were built to identify potential relationships among environmental factors and the occurrence of pygmy sperm whale strandings in the Southeastern U.S.
- This study concluded that environmental conditions (e.g., high wind speeds, low barometric pressures, and swell waves in combination with high MEI values can predict times of anticipated pygmy sperm whale strandings in the southeast US.

Pygmy sperm whales are the second most commonly stranded marine mammal in the Southeastern United States. They most often strand alive and the causes of these events remain largely unknown. Generalized linear models were built to identify potential relationships among environmental factors and the occurrence of



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

pygmy sperm whale strandings in the Southeastern U.S.. Two methods were used to model environmental parameters depending on the nature of the data. One method used data from NOAA buoys compiled over a week before a stranding event. Predictor variables included hourly wind direction and speed, wave height, average wave period, barometric pressure, and water temperature. The other method used Sea Surface Temperature data from satellite images compiled monthly, monthly Multivariate El Niño Southern Oscillation Index (MEI), and bathymetric data. Frontal features were extracted from the images using ArcMap Geographic Information System and landscape metrics were computed on these images in FRAGSTATS. The model compiled from buoy data was relatively stronger at predicting strandings. The model indicated that more strandings occurred when there were sustained high wind speeds, low barometric pressures, and swell waves in the week before stranding events. While the other model was relatively weaker, it showed that less numerous fronts and high MEI index were generally associated with a higher number of strandings. This study is a step toward appreciating which environmental factors may contribute to the observed marine mammal stranding patterns as well as the distribution of pygmy sperm whales. It is an attempt at building predictive statistical models that could be useful for the management of cetaceans

Expected publication date: September 2015

NMFS Publications

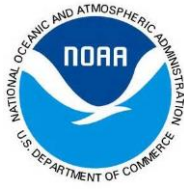
5th International Otolith Symposium

A Conference Review

R. McBride (NMFS/NEFSC), J. O'Malley (NMFS/PIFSC), T. Gerard (NMFS/SFSC), and B. Barnett (NMFS/SFSC)

- Presentations on how otolith shape affects hearing and other fundamental processes in fish.

Laboratory experiments can reveal underlying mechanisms to how otolith shape affects hearing in fish, but one experimental presentation suggested that researchers' understanding of this is incomplete. Recent modeling studies are improving and can better predict optical banding patterns in otoliths that are used to age fish. Several presenters advocated that otolith weight could be a cost



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

efficient proxy for fish age, especially in data poor fisheries stock assessments, suggesting that more routine use of this perennially promising technique may be on the horizon. The statistical analysis of otolith morphometrics also proved useful for stock discrimination and cryptic species identification. Several presenters focused on the potential effects of ocean acidification and climate change on elemental and stable isotope incorporation into otoliths.

Expected publication date: 11 September 2015

Link to full text: <http://dx.doi.org/10.1080/03632415.2015.1083382>

Geomorphic responses to U.S. dam removals—a two-decade perspective

Gravel Bed Rivers 8 (John Wiley and Sons, Inc)

J. J. Major, A. E. East, J. E. O'Connor, G. E. Grant, A. C. Wilcox, C. S. Magirl, **M. J. Collins**, (NMFS/OHC), and D. D. Tullos

- Rivers are resilient and physical response is quicker than expected: a degree of stability downstream is reached within months-years, not decades.
- Modest streamflows can erode large proportions of reservoir sediment and move it downstream.
- Dam height, sediment volume, and sediment size strongly influence downstream physical response to dam removal.

Recent decades have seen a marked increase in the number of dams removed in the United States. What began with removal of small dams impounding modest sediment volumes has progressed to removal of large dams impounding millions of cubic meters of sediment. Investigations following a number of removals are beginning to inform how, and how fast, rivers and their ecosystems respond to sediment release. Though detailed studies of physical responses to removal are relatively few (a few tens of studies), common findings have begun to emerge. They include: (1) Rivers are resilient and respond quickly to dam removals—especially when removals are sudden rather than prolonged. Rivers can swiftly evacuate large fractions of reservoir sediment ($\geq 50\%$ within one year), especially when sediment is coarse grained (sand and gravel). The channel downstream typically takes months to years—not decades—to achieve a degree of stability within its natural range of variability. (2) Modest streamflows can erode large amounts of reservoir sediment and move it downstream. Once the most easily



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

accessed sediment is eroded, greater streamflows are needed to access remnants of reservoir sediment and transport it downstream. (3) Dam height, sediment volume, and sediment caliber strongly influence downstream response to dam removal. Removals of large dams (≥ 10 m tall) have had longer lasting and more widespread downstream effects than more common removals of small dams. (4) Downstream valley morphology and position of a dam within a watershed exert a strong influence on the distribution of released sediment. Valley confinement, downstream channel gradient, locations and depths of channel pools, locations and geometries of extant channel bars, and locations of other reservoirs all influence the downstream fate of released sediment.

Expected publication date: Early 2016

SCOR Working Group 137: "Global Patterns of Phytoplankton Dynamics in Coastal Ecosystems": An introduction to the special issue of Estuarine, Coastal and Shelf Science

Estuarine, Coastal and Shelf Science (2.057)

H. W. Paerl, K. Yin, and **T. D. O'Brien (NMFS/OST)**

- This introduction to the Special Issue highlights the importance of having sustained and continuous sampling (e.g. time series data) for making management and policy decisions in estuarine and marine ecosystems.
- NOAA, through the NMFS/ST COPEPOD project, provided data management and analytical support to SCOR WG137, participating directly and indirectly in most of the papers found within this Special Issue.

Expected publication date: September 2015

Link to full text paper:

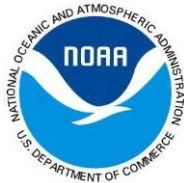
<http://www.sciencedirect.com/science/article/pii/S0272771415002322>

Cross Line Office Publications

Advancing tools for modeling, forecasting and managing for Vibrio spp. in Washington State

NOAA Tech Memo

R. Paranjpye (NMFS/NWFSC), L. Johnson, **J. Jacobs (NOS/NCCOS)**, and A. DePaola



NOAA SCIENTIFIC PUBLICATIONS REPORT SEPTEMBER 28, 2015

- This is a report on the first of a series of workshops to be held around the country to assist stakeholders in using NOAA environmental data and FDA *Vibrio* expertise to better manage risk of illness from consumption of shellfish.
- Regional priorities directly obtained from users allows for streamlining of NOAA modeling efforts to meet direct management needs.

Shellfish aquaculture generates \$185 million USD annually in the State of Washington dispersed among small farmers, tribal entities and large companies. Demand for half-shell product from the region is high, as are the number of *Vibrio*-related illnesses associated with consumption of raw shellfish. The vast majority of *Vibrio*-related illnesses in Washington State are associated with a single species, *Vibrio parahaemolyticus* (Vp). The intent of this workshop was to bring together tribal and non-tribal industry representatives, Federal subject matter experts, State shellfish control authorities, and academic researchers to explore new tools to improve harvest and post-harvest strategies and practices to reduce the risk of illness. This proceedings report documents the outcomes of the workshop. Some topics include: supply chain monitoring to validate risk assessment models from harvest to consumption and identify variability in handling; the development of intertidal exposure models to accurately predict oyster temperature and Vp abundance and identification of cool water refuge for purging and wet storage of product; the development of purge calculators to predict length of wet storage at various temperatures needed to ensure safe product; research to define the relative influence of harvest and culture practice on Vp concentrations and effectiveness of re-submergence.

Expected publication date: October 2015